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Selective Solvent Induced Orientation Control of PS-PDMS Self-Assembly for Block Copolymer Nanolithography

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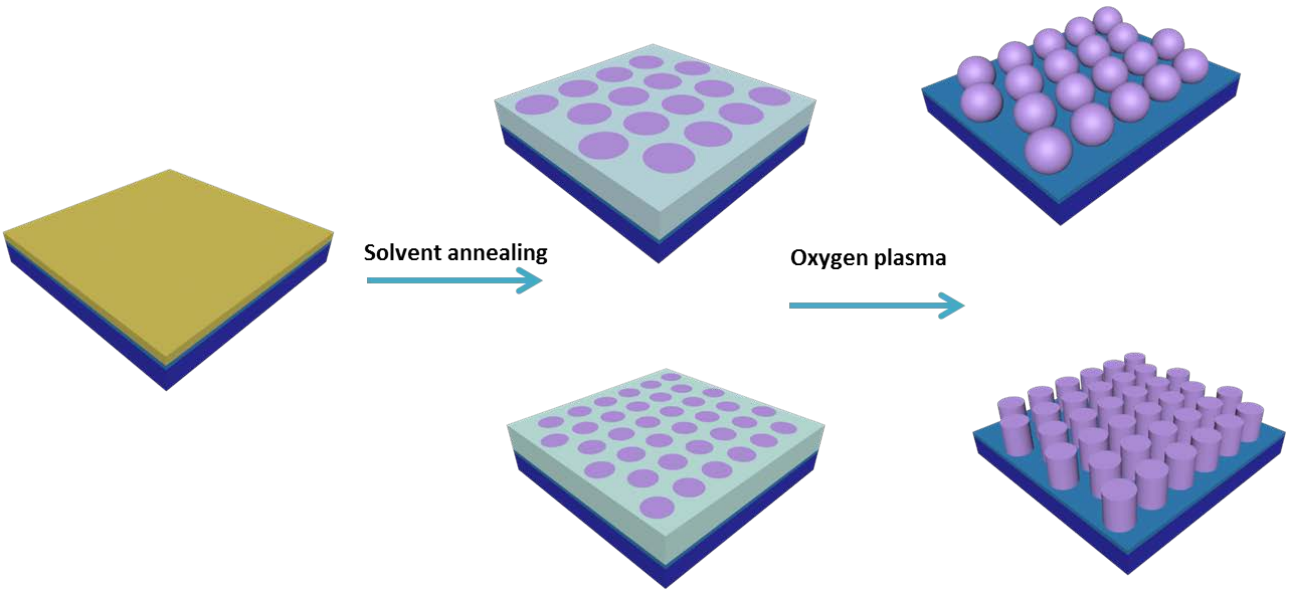
A simple and viable method was developed to produce nanostructures on different substrates such as silicon, silicon dioxide, polymer and graphene by using block copolymer self-assembly. Block copolymer (BC) self-assembly constitutes a powerful platform for nanolithography. However, there is a need for a general approach to BC lithography that critically considers all the steps from substrate preparation to the final pattern transfer. We present a procedure that significantly simplifies the main stream BC lithography process, showing a broad substrate tolerance and allowing for efficient pattern transfer over wafer scale.

PS-rich poly(styrene-b-dimethylsiloxane) (PS-b-PDMS) copolymers are directly choosed to as a pattern for the graphene application. Oxide-PDMS nanopillars formed after oxygen plasma etching. We transfer graphene on nanopillars by using this template. The use of nanodaots patterned by self-assembled block copolymer allows us to conveniently fabricate arrays of periods nanopillars without using any complicated and expensive fabrication systems. This technique presented could be readily applied to various types of graphene-based ecectronic and optoelectronic devices.



Scheme 1. Schematic workflow of direct BCs nanolithography: SDs in Cyclohexane are directly cast on various substrates including PS, graphene and silicon.